

MWI 8621.1

REVISION B

EFFECTIVE DATE: October 29, 2004

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MARSHALL WORK INSTRUCTION

QD01

CLOSE CALL AND MISHAP REPORTING AND INVESTIGATION PROGRAM

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		3/27/00	
Revision	A	8/22/01	Document rewritten in its entirety.
Revision	B	10/29/2004	Document revised to meet NPR 8621.1 latest rev and reformatted per HQ requirements review.

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1. PURPOSE

In accordance with NPD 8621.1, “NASA Mishap and Close Call Reporting, Investigating and Recordkeeping Policy,” NASA policy is to report, investigate, and document NASA mishaps, close calls and previously unidentified serious workplace hazards to prevent recurrence and determine the root cause(s) in order to develop and implement corrective actions. The purpose of this Directive is to provide the requirements in close call and mishap reporting, investigation, and recordkeeping; explain how the program shall be conducted in compliance with NASA, Marshall Space Flight Center (MSFC), and Occupational Safety and Health Administration (OSHA) requirements and policies; and establish responsibilities for employees to prevent injury, illness, and loss or damage to NASA/MSFC property.

2. APPLICABILITY

This Directive is applicable to all persons on MSFC property and contractors involved in MSFC operations and MSFC civil service employees.

3. APPLICABLE DOCUMENTS

3.1 Marshall Engineers and Scientists Association (MESA) Agreement (see URL: <http://mesa.msfc.nasa.gov/contract.htm>)

3.2 MPR 1040.3, “MSFC Emergency Plan”

3.3 MPD 1380.1, “Release of Information to News and Information Media”

3.4 MPR 1440.2, “MSFC Records Management Program”

3.5 NPR 1441.1, “NASA Records Retention Schedules”

3.6 NPR 3792.1, “Plan for a Drug-Free Workplace”

3.7 MPR 3810.1, “MSFC Management of Workers’ Compensation Injuries”

3.8 NPR 8621.1, “NASA Procedural Requirements for Mishap Reporting, Investigating, and Recordkeeping”

3.9 The Privacy Act of 1974, as amended, 5 U.S.C. 552a

4. REFERENCES

4.1 29 CFR Part 1904, “Recording and Reporting Occupational Injuries and Illnesses”

4.2 29 CFR 1926.22, “Recording and Reporting of Injuries”

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4.3 29 CFR Part 1960, “Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters”

4.4 MPR 8715.1, “Marshall Safety, Health, and Environmental (SHE) Program”

4.5 NPR 8715.3, “NASA Safety Manual”

4.6 NFS 1852.223-70, “Safety and Health”

4.7 Letter from Frederick D. Gregory, September 9, 2004, “Notification of Lost-Time Injuries, Illnesses, and Mishaps”

5. DEFINITIONS

The list below addresses the most commonly used mishap terms. For a complete list of terms see NPR 8621.1.

5.1 Appointing Official. The official authorized to appoint the Investigating Authority for a Mishap or Close Call, to accept the investigation of another authority, to receive endorsements and comments from endorsing officials, and to approve the mishap report.

5.2 Cause. An event or condition that results in an effect. Anything that shapes or influences the outcome.

5.3 Close Call. An occurrence in which there is no injury or only minor injury requiring only first aid, no equipment or property damage equal to or greater than \$1,000, and no significant interruption of productive work, but which possesses a high severity potential for a mishap. See Appendix Z for additional clarity.

5.4 Corrective Action Plan (CAP). A formal document addressing findings of investigations with emphasis on correcting the root cause of the mishap.

5.5 CAP Closure Statement. A final statement made by the appointing official that documents that all corrective actions have been completed and the CAP is closed.

5.6 Corrective Actions. Changes to design processes, work instructions, workmanship practices, training, inspections, tests, procedures, specifications, drawings, tools, equipment, facilities, resources, or material that result in preventing, minimizing, or limiting the potential for recurrence of a mishap.

5.7 Direct Cost of Mishap or Close Call (for the purpose of mishap classification). The sum of the costs (the greater value of actual or fair market value) of damaged property, destroyed property, or mission failure, actual cost of repair or replacement, labor (actual value of replacement or repair hours for internal and external/contract labor), cost of the lost commodity (e.g., the cost of the fluid that was lost from a ruptured pressure vessel), as well as resultant costs

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such as environmental decontamination, property cleanup, and restoration, or the best official estimates of these costs.

5.8 Endorsing Official. Official who reviews the signed mishap report and provides a signed written endorsement, comments (when applicable), and a recommendation for approval or rejection of the mishap report.

5.9 Ex Officio Representative. An individual authorized to participate in all investigation proceedings and tasked to assure that the investigation is conducted in conformance with NASA and MSFC requirements.

5.10 First Aid. Any one-time treatment of minor scratches, cuts, burns, splinters, etc., which do not ordinarily require medical care, and any follow-up visit for the purpose of observation. Such one-time treatment, and follow-ups visit(s) for the purpose of observation, is considered first aid even though provided by a physician or registered professional. Reference 29 CFR 1904.7(b)(5)(ii) for complete definition.

5.11 High Visibility (Mishap or Close Call). The particular mishaps or close calls, regardless of the amount of property damage or personnel injury, that the Administrator, Associate Administrator of Office of Safety and Mission Assurance (AA/OSMA), Center Director (CD), Director of Headquarter Operations (HQ Ops), or Center Safety & Mission Assurance (S&MA) Director judges to possess a high degree of programmatic impact or public, media, or political interest including, but not limited to, mishaps and close calls that impact flight hardware, flight software, or completion of critical mission milestones.

5.12 Human Factors Mishap Investigator. An investigator with expertise in human factors engineering and mishap causation who has the primary responsibility to assist in the collection and analysis of data, determine how human factors caused or contributed to the mishap or close call, evaluate relevant human error and determine its root cause(s), and generate recommendations that eliminate or reduce the occurrence of the error or minimize the negative effects of the error to prevent the recurrence of the mishap.

5.13 Incident Reporting Information System (IRIS). The NASA mishap data base which contains mishap investigation data and provides tools to track CAPs to completion, submit status and closure data to NASA Headquarters, and perform mishap trend analysis.

5.14 Investigating Authority. The individual mishap investigator, mishap investigation team, or mishap investigation board authorized to conduct an investigation for NASA.

5.15 Lessons Learned. The written description of knowledge or understanding gained by experience, whether positive (such as a successful test of mission), or negative (such as a mission failure); a lesson that is significant (has real or assumed impact on operations); valid (is factually and technically correct); and applicable (identifies a specific design, process, or decision that reduces or limits the potential for failures and mishaps); or reinforces a positive result.

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5.16 Lost Workday Case (Lost-time Injury/Illness). An occupational nonfatal traumatic injury that causes lost time from work beyond the day or shift on which it occurred; or a non-traumatic illness that causes disability at any time.

5.17 Lost Workdays. The number of days (consecutive or not) after, but not including, the day of injury or illness during which the employee would have worked but could not do so; i.e., could not perform all or any part of his normal assignment during all or any part of the workday or shift because of the occupational injury or illness. Includes days away, restricted duty, or transfer to another job. Total number includes weekends and holidays occurring during the lost workday period.

5.18 Medical Treatment. The management and care of a patient to combat disease or disorder. Includes treatment administered by a physician or by registered professional under the standing orders of a physician. Medical treatment does not include visits to a physician for observation or counseling, diagnostic procedures such as X-rays and blood test including administration of prescription medications used solely for diagnostic purposes' or first aid treatment even though provided by a physician or registered professional personnel.

5.19 Mishap Investigation Board (MIB). A NASA-sponsored board that is appointed for a Type A, Type B, or high visibility mishap or close call; requires concurrence from the AA/OSMA on membership; consists of an odd number of Federal employees where the majority of the members are independent from the mishap operation; includes a safety officer, human factors mishap investigator, and occupational health physician as members.

5.20 Mishap Investigation Team (MIT). A NASA-sponsored team that is appointed by the Center Director or Director, HQ Ops, or designee for Type C, Type D mishap or close call; consists of an odd number of Federal employees with the majority of members independent of the mishap operation; and includes a safety officer and human factors mishap investigator as members.

5.21 Mishap Investigator. A Federal employee who has expertise in mishap or close call investigations; has knowledge of human error analysis in mishaps; serves as the sole investigator for a Type C mishap, Type D mishap, or close call; and is tasked to investigate the mishap or close call per this MWI and NPR 8621.1.

5.22 MSFC Flash Mishap Report. An electronic initial mishap report used to quickly notify MSFC management that a mishap has occurred.

5.23 NASA Mishap. An unplanned event that results in injury to non-NASA personnel, caused by a NASA operation; damage to public or private property caused by NASA operations or NASA funded development or research projects; occupational injury or illness to NASA personnel; NASA mission failure; or destruction or damage to NASA property.

5.23.1 **Exceptions** to the NASA Mishap definition are:

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5.23.1.1 A malfunction or failure of component parts that are normally subject to fair wear and tear and have a fixed useful life that is less than the fixed useful life of the complete system or unit of equipment, provided that the following are true: a) there was adequate preventive maintenance; and b) the malfunction or failure was the only damage and the sole action is to replace or repair that component;

5.23.1.2 Test failures in which the damage was unexpected or unanticipated where the test article is not flight hardware, testing is part of an authorized research/development/qualification/certification program, damage is limited to the test article and instrumentation, risk was accepted and documented, and test team generates a test failure report.

5.23.1.3 Mishaps resulting in damage to aircraft, space hardware, or ground support equipment that meet these criteria are included,

5.23.2 NASA mishaps are categorized as follows:

5.23.2.1 Type A Mishap. A mishap causing death, permanent total disability, or hospitalization of three or more patients (within 30 days); or damage to equipment or property equal to or greater than \$1 million; a crewed aircraft hull loss; or unexpected aircraft departure from controlled flight, excepting high performance jet/test aircraft.

5.23.2.2 Type B Mishap. A mishap resulting in permanent partial disability to one or more persons, hospitalization (within a 30-day period from the same mishap) of less than three persons, and/or damage to equipment or property equal to or greater than \$250,000, but less than \$1 million.

5.23.2.3 Type C Mishap. A mishap resulting in damage to equipment or property equal to or greater than \$25,000, but less than \$250,000, and/or causing occupational injury or illness that results in a lost workday case.

5.23.2.4 Type D Mishap. A mishap consisting of personal injury of less than Type C Mishap severity but more than first aid severity, and/or property damage equal to or greater than \$1,000, but less than \$25,000.

5.23.2.5 Mission Failure. A mishap of whatever intrinsic severity that, in the judgment of the Enterprise Associate Administrator, program/project manager or the Associate Administrator for OSMA, prevents the achievement of primary NASA mission objectives as described in the Mission Operations Report or equivalent document.

5.24 Observation. A factor, event, or circumstance identified during the investigation that did not contribute to the mishap or close call, but, if left uncorrected, has the potential to cause a mishap or increase the severity of a mishap; or a factor, event, or circumstance that is positive and should be noted.

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5.25 Organizational Factor. Any operational or management structural entity that exerts control over the system at any stage in its life cycle, including , but not limited to, the system's concept, development, design, fabrication, test, maintenance, operation, and disposal, i.e., budget, policy, management decisions.

5.26 Quick Incident Report. Electronic entry for initial mishap entry into IRIS that can be used without requiring a password. Does not provide notification distribution associated with Flash Report, to replace current online MSFC Flash Report.

5.27 Pre-mishap Plans. Pre-approved documents outlining timely organizational activities and responsibilities that are accomplished in response to emergency, catastrophic, or potential (but not likely) events encompassing injuries, loss of life, property damage, or mission failure.

5.28 Proximate Cause. The event(s) that occurred, including any condition(s) that existed immediately before the undesired outcome, directly resulted in its occurrence and, if eliminated or modified, would have prevented the undesired outcome. Also known as direct cause(s).

5.29 Responsible Organization. The organization responsible for the activity, people, or operation/program where a mishap occurs or the lowest level of organization where corrective actions are implemented.

5.30 Root Cause. One of multiple factors (events, conditions or organizational factors) that contributed to or created the proximate cause and subsequent undesired outcome and, if eliminated or modified, would have prevented the undesired outcome. Typically, multiple root causes contribute to an undesired outcome.

5.31 Serious Workplace Hazard. A condition, practice, method, operation, or process that has a substantial probability that death or serious physical harm could result and the employer did not know of its existence or did not exercise reasonable diligence to control the presence of the hazard.

5.32 Witness Statement. A verbal or written statement from a witness that describes his/her account including a description of the sequence of events, facts, conditions, and/or causes of the mishap, which is considered privileged and is only releasable to the investigating authority and not the public or other government agencies unless release is ordered by a court of law.

6. INSTRUCTIONS

The following instructions are requirements to plan, report, investigate, develop, and implement corrective action plans pertaining to the MSFC mishap program.

6.1 Pre-Mishap Planning

6.1.1 Pre-Mishap Plans

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6.1.1.1 This document shall serve as the MSFC Pre-Mishap plan which provides the policy and procedures for mishap reporting investigation and closure; interrelationship with Center emergency preparedness plans; and program and project plans.

6.1.1.2 Program and project managers shall develop pre-mishap plans that define MSFC's roles and responsibilities from the time a failure, accident, or incident occurs in their program/project until the investigation is complete (e.g., MSFC-SSCP-5-77, "MSFC Space Shuttle Contingency Plan," and SSP 50190, "International Space Station Program Contingency/Mishap Action Plan") to include mishap notifications, special program or project procedures for responders and investigators, relation to Center pre-mishap plan, and resources to be used.

6.1.1.3 S&MA and MSFC's Emergency Management Director shall review pre-mishap plans.

6.1.2 Facility or Test Emergency Procedures

6.1.2.1 Building managers and test engineers shall develop emergency procedures when unique actions are required. An example is when test stand systems are secured prior to admitting the fire department to the scene. Another example is when it is necessary for Protective Services to shut off all utilities following an incident that occurs after hours.

6.1.2.2 S&MA and MSFC's Emergency Management Director shall review the emergency procedures.

6.1.3 Special Case Considerations

6.1.3.1 MSFC directorates, offices, the Administrative Officer, and supervisors shall maintain and update emergency notification contact lists for their employees and update those lists when changes occur. (e.g., telephone numbers of a spouse who needs to be notified following a serious injury).

6.1.3.2 Supervisors shall make plans for evacuation for disabled employees and periodically practice and demonstrate these plans.

6.2 Initial Reports

Each employee shall be responsible for reporting emergencies, unsafe or potentially unsafe conditions, mishaps, and close calls in the workplace. Employees shall be guaranteed freedom from restraint, interference, coercion, discrimination, or reprisal for exercising their rights.

6.2.1 To Report an Emergency, employees shall:

6.2.1.1 Dial "911" to report an emergency.

6.2.1.2 For fire or explosion, call "911" and activate building fire alarm.

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NOTE: Always play it safe with personnel injuries. Do not perform self-evaluations, seek medical evaluation and then notify management with all available information.

6.2.2 Initial Mishap Notifications

6.2.2.1 An initial estimate of severity based on injuries or cost shall be done by the responsible supervisor to determine the mishap type and notifications required. Mishap type is defined in section 5.23.2.

6.2.2.2 Cost of the mishap shall be determined as defined in section 5.7 and with the additional conditions:

- a. If replacement parts are available, replacement cost shall be used even if salvage/excess parts are available.
- b. Insurance or contractor compensation shall not be considered.
- c. Cost of mishap investigation shall not be included.

6.2.3 The following situations shall be reported by the responsible director immediately upon occurrence or awareness to the Center Director and Director of S&MA to be conveyed by the Center Director to the Agency Administrator telephonically within 24 hours:

6.2.3.1 All Type A and Type B mishaps, and Type C mishaps involving a NASA lost-time injury or illness.

6.2.3.2 Any non-occupationally-related fatality of a NASA civil service or resident contractor employee that occurs onsite.

6.2.3.3 Any fatality or serious injury or illness of a NASA civil service or resident contractor employee that does not occur on a NASA facility when it becomes known. (In these instances, reporting is voluntary on the part of the Family member or next of kin.)

6.2.4 For Type A, Type B, and high visibility mishaps or close calls, the responsible manager shall notify the Center Director or Deputy Director and Director, S&MA, immediately.

6.2.4.1 After emergency response has been initiated, S&MA shall notify the NASA Headquarters OSMA within one hour at 202-358-0006 or 1-866-230-6272 with notification acknowledged by HQ.

6.2.4.2 The notification to HQ shall provide Center name; location of incident; time of incident; number of fatalities; number of hospitalized employees; type of injury; type of damage; contact person and phone number; and brief description of mishap.

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6.2.4.3 S&MA shall ensure work related Type A and Type B injury or illness mishaps are reported to OSHA (1-205-731-1534 or 1-800-321-6742) within 8 hours and receipt acknowledged.

6.2.4.4 The OSHA report shall provide establishment name; location of incident; time of incident; number of fatalities and/or number of hospitalized employees (if known); Center contact person and phone number; and a brief description of the incident.

6.2.5 **All** onsite mishaps and close calls (including those addressed in the previous sections 6.2.3 and 6.2.4) shall be reported to the Industrial Safety Office within 4 hours of occurrence or awareness by calling (256) 544-4357, Option “0” (NASA Information Support Center) or the MSFC Industrial Safety Hotline at (256) 544-4357, Option “2”, or by electronic submittal from the MSFC SHE Page, under the “Report a Mishap” block to generate a NASA Initial Safety Incident Report, also known as a Flash or Quick Incident Report.

6.2.5.1 If the notification is by phone, the NASA Information Support Center or MSFC Industrial Safety Department shall generate and distribute the MSFC Flash or Quick Incident Report.

6.2.5.2 Notification distribution shall be determined by the mishap classification and program or project relation.

6.2.6 Contractors shall report mishaps as specified in their contract (e.g., DRD No. STD/SA-MSR, “Mishap and Safety Statistics Reports”) and in NFS 1852.223-70.

6.2.7 Within 24 hours, all mishaps shall be entered into IRIS by either Industrial Safety or the mishap originator and electronic follow-up sent to HQ for those mishaps covered in section 6.2.3 and 6.2.4 which updates the previous information (section 6.2.4.2) and includes author of report; author’s phone number and mail code; date report submitted; time report submitted; exact location if known; responsible organization and point of contact; POC’s phone number and mail code; mission affected; program impact (if known), estimate of direct cost; and update to brief description.

6.2.8 Mishaps involving injury or illness to NASA civil service personnel shall be recorded on the OSHA 300 Log as required by 29 CFR Part 1904.7. The OSHA 300 Log may be retained in IRIS. Contractors are responsible for maintaining their own OSHA 300 Log.

6.2.9 If it is suspected that a mishap resulted from criminal activity, the Office of Inspector General (OIG) and the Center’s Office of the Chief Counsel or NASA Office of the General Counsel shall be notified.

6.2.10 Contractor fatalities shall be reported to S&MA immediately and to their local OSHA offices within 8 hours.

6.2.11 Information shall be released to the media per MPD 1380.1, Release of Information to News and Information Media as soon as possible to alert the Center employees and the public of

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any known hazards and potential effects to them resulting from a mishap, along with instructions to mitigate the risk. Type A, B, C and high visibility mishaps and close calls are covered by Headquarters PAO. Type B and C may be delegated to the Center PAO.

6.3 Securing the Mishap Site

6.3.1 MPR 1040.3, “MSFC Emergency Plan,” shall be the authority document for onsite mishaps when MSFC’s emergency system is activated (i.e., “911” is called).

6.3.2 Protective Services’ guards shall secure the site and take action to preserve the mishap site for the investigation.

6.3.3 S&MA shall ensure actions are taken to control the scene for protection of people and property. S&MA may also request photography lab support, if required.

6.3.4 S&MA shall activate the Center Pre-Mishap Plan by ensuring the appropriate notifications and investigation processes are initiated and Interim Response Team (IRT) activated.

6.3.5 Evidence preservation shall not hamper essential rescue operations.

6.3.6 If a mishap is program or project related, the responsible manager shall initiate the Program or Project Pre-Mishap Plan at this time.

6.3.7 If the mishap results in a death, personal injury requiring immediate hospitalization, or in damage estimated to be in excess of \$10,000 to Government or private property, the responsible supervisor shall refer to NPR 3792.1A, “NASA Plan for a Drug-Free Workplace,” to determine whether additional action outside the safety mishap reporting and investigating process shall be taken.

6.4 Appointing the Investigating Authority

6.4.1 The Appointing Official shall determine the mishap type and establish the level of investigating authority required. The mishap classification or level of investigation may be elevated by the Administrator, AA, AA/OSMA, Designated Agency Safety and Health Official (DASHO), Center Director or Director HQ Ops if the mishap is identified as High Visibility.

6.4.2 The Investigating Authority shall be responsible for investigating the mishap and providing the mishap report to the Appointing Authority.

6.4.3 For Type A, Type B, High Visibility Mishap, High Visibility Close Call, the Investigating Authority shall be a Mishap Investigation Board (MIB) which is a NASA-sponsored board that:

- a. Requires concurrence from AA/OSMA on membership, AA/OSMA endorsement of Investigation report, and EAA specific concurrence of reports on their enterprise.

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b. Consists of odd number of Federal employees, majority who are independent from the mishap operation.

c. Requires a minimum of 5 voting members for Type A and 3 voting members for Type B.

d. Provides a Safety officer, Human Factors investigator, and physician as voting members.

6.4.4 For Type C and Type D Mishaps and Close Calls the Investigating Authority shall be either a Mishap Investigation Team (MIT) or a Mishap Investigator (MI).

6.4.5 The Mishap Investigation Team shall be a NASA-sponsored team that:

a. Is appointed by Center Director, Director, HQ or designee.

b. Consists of an odd number of Federal employees where the majority are independent of the mishap operation.

c. Provides a Safety officer and human factors investigator as voting members.

d. Provides an ex officio at an authority level consistent with the team chair.

6.4.6 A Mishap Investigator shall be a Federal employee who has:

a. Expertise and experience in mishap or close call investigation.

b. Knowledge of human error analysis.

6.4.7 Serious workplace hazards that are discovered during inspection shall be investigated in the same manner as a close call.

6.4.8 Non-serious hazards shall be documented and tracked in the existing MSFC SHEtrak.

6.4.9 A Contractor Mishap Board, Team, or Investigator shall be determined by the Contractor per the requirements of their contract, however NASA may convene a NASA Investigating Authority if desired.

6.4.10 Data, records, equipment and facilities that may be involved in the mishap shall be impounded to prevent unauthorized use or modification after the mishap.

6.4.11 S&MA shall ensure control of the impounded items until release to the responsible organization or the investigating authority.

6.4.12 Any mishap board investigating an incident affecting unit employees represented by the Marshall Engineers and Scientist Association (MESA) shall include a member appointed by the MESA President (reference Section 19.06 of the NASA/MESA negotiated agreement).

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6.4.13 Investigation Boards shall be made up as follows:

6.4.13.1 Ordinarily, only full-time Federal employees appointed as members of a Type A or Type B MSFC Investigation Board or Investigation Team.

6.4.13.2 Contractor employees as nonvoting consultants or advisors. Before a contractor employee is appointed as a member of any MSFC investigation board or team, the concurrence of the Chief Counsel's Office shall be obtained. In those situations, the Chief Counsel's Office shall consider the applicability of the Federal Advisory Committee Act (which does not apply when only full-time Federal employees are appointed).

6.4.13.3 An S&MA facilitator or ex officio assigned to each MSFC mishap investigation to ensure the requirements of NPR 8621.1 and this Instruction are followed.

6.4.14 The Appointing Official shall document (memorandum or management announcement) the members of the investigating authority; its charter; and a due date for the mishap report (see Appendix A). An e-mail addressing these items is sufficient for Type C, Type D, and close calls with potential of C or less.

6.4.15 The Appointing Official shall ensure that the SHE Committee is informed of the ongoing investigation for coordination with the appropriate subcommittee as necessary.

6.5 Investigation

6.5.1 After the immediate emergency actions have been accomplished, the formal investigation shall begin. The type of investigating authority, depth of investigation, and products required from the investigation authority shall be determined by the mishap severity level. (See Appendix B for Mishap Investigation Levels Table).

6.5.2 Mishap investigations shall be in accordance with the requirements in NPR 8621.1. Mishap Investigation steps are listed in Section 5 of the NPR.

6.5.3 Type A and B Mishaps and High Visibility Close Calls or Mishaps shall establish the MIB or MIT as the investigating authority to perform the formal investigation and develop the formal mishap investigation report.

6.5.4 Investigations of Type C and less severe mishaps shall be conducted by a MIT or MI and, as a minimum, include:

6.5.4.1 Verification that site is safe and secure.

6.5.4.2 Collection examination, and safeguard of evidence. Evidence includes:

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a. Employee and witness interview(s) (see Section 9 for limitation on distribution of Witness Statements and Appendix C for the statement that shall be provided to the witness);

b. Photographs or sketches of the scene;

c. Failed equipment;

d. Procedures used;

e. Data tapes, diskettes, or records.

6.5.4.3 Performance of appropriate analysis to determine all probable proximate cause, root cause, and contributing factors.

6.5.4.4 Generation of conclusions and findings supported by facts.

6.5.4.5 Generation of recommendations which address all findings.

6.5.5 Investigations by outside authorities shall be accepted if they adequately address proximate cause, root cause and contributing factors. Examples are:

6.5.5.1 Traffic Accidents involving NASA employees in the course of duty when investigated by the local authorities having jurisdiction.

6.5.5.2 A NASA employee injury or fatality resulting from a criminal or terrorist act investigated by a local or Federal law enforcement agency.

6.5.5.3 A NASA employee injury or fatality resulting from a commercial transportation mishap investigated by the authority having jurisdiction such as FAA or NTSB.

6.5.6 Only the Investigating Authority shall release the site for post investigation cleanup or activation.

6.6 Mishap Reports

6.6.1 The responsible organization shall submit a follow-up mishap notification either electronically through IRIS or on the NASA Form 1627 for the mishap or close call to S&MA within 6 calendar days. Typically, the NASA supervisor submits the information for an MSFC mishap and the contractor's safety officer or manager submits one for a contract mishap.

6.6.2 For NASA employees who sustain personal injury as a result of a mishap, applicable worker's compensation forms shall be completed by the employee and supervisor then forwarded to S&MA within 2 days of the injury. Instructions are provided in MPR 3810.1, "MSFC Management of Workers' Compensation Injuries."

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6.6.3 Type A and Type B Mishap Investigation Reports shall be submitted in accordance with instructions in NPR 8621.1, Chapter 6 “Mishap Report.”

6.6.4 Type C , Type D, and close call mishap investigation reports shall be submitted to S&MA within 30 calendar days unless originally tasked otherwise by the Appointing Official with extensions requested in writing to the Appointing Official.

6.6.5 Type A and B mishap board reports shall use the format specified in NPR 8621.1.

6.6.6 Type C, Type D, and close call reports shall use the format specified in Appendix D.

6.6.7 The Mishap Investigation Report shall be submitted to the Appointing Authority in accordance with instructions in the appointment letter.

6.6.8 A draft report shall be submitted to the Appointing Authority and the Center Safety Office for review with feedback supplied within 15 days with additional offices included in the preliminary review, as determined by the Appointing Authority.

6.6.9 Minority opinion or dissenting view held by Investigation members shall be attached to the report.

6.6.10 Upon submittal of the final Mishap Investigation Report, the Investigating Authority shall be released.

6.6.11 The Appointing Official shall determine who should review and endorse the final report and respond within 20 days.

6.6.12 If the report is rejected, a new Investigating Authority shall be assigned.

6.6.13 An approved report shall be sent to the appropriate level NASA legal official, NASA import/export control official, NASA public affairs official, and any other NASA program or policy official(s) as appropriate for compliance with NASA policies for review and reply within 10 days.

6.6.14 The Mishap Report shall be distributed per NPR 8621.1, Section 6.5, Distribute Mishap Reports.

6.7 Corrective Action Plan

6.7.1 The Appointing Official shall tasks the responsible organization to develop, finalize, and submit a CAP and the lessons learned. If a draft CAP is included with the report, it may be used as a starting point or as guidelines for forming a CAP. The final CAP and approved lessons learned shall be completed and filed with the official approved report

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6.7.2 A CAP shall be developed for all mishaps and close calls by the responsible organization and submitted to the Appointing Official within 15 calendar days of receipt of the mishap investigation report (see Appendix E).

6.7.3 The plan shall address the recommendations in the mishap investigation report, include actions to correct the situation that caused the mishap, and prevent the same or similar mishap from reoccurring. The major objective is to address and correct the root causes for the mishap.

6.7.4 The CAP shall include:

6.7.4.1 Root cause(s) of the mishap.

6.7.4.2 A description of the corrective actions necessary to eliminate the causes.

6.7.4.3 Who is responsible for performing the action, or which NASA organization is responsible for ensuring the action is completed (if the action is to be performed for the responsible organization by a contractor or other NASA organization).

6.7.4.4 A completion date for each action, provided by the performing organization.

6.7.4.5 A matrix or other means of matching corrective actions to mishap root causes or findings.

6.7.4.6 A review of any process changes required based on the corrective actions.

6.7.5 The Appointing Official shall be responsible for the acceptance or rejection of the plan with the investigating authority and the applicable S&MA organization support in assessing the CAP, if requested.

6.7.6 If the plan is rejected, it shall be returned with comments to the responsible organization for revision and re-submittal.

6.7.7 The Appointing Official shall determine the timeframe for re-submittal of the CAP.

6.7.8 If the plan is accepted, the Appointing Official shall:

6.7.8.1 Direct the responsible organization(s) to implement the plan.

6.7.8.2 Provide the plan to S&MA for distribution to interested parties and formulation of S&MA assurance (audit) plan.

6.7.9 Either the responsible organization or the S&MA shall enter the approved corrective actions into IRIS for tracking.

6.8 Implement Corrective Action Plan

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6.8.1 Upon receipt of the CAP, organizations with assigned actions shall implement the approved CAP as directed by the Appointing Official.

6.8.2 Typically the responsible organization(s) shall :

6.8.2.1 Implement corrective actions as soon as possible and communicate completion to the Appointing Official and S&MA.

NOTE: All actions are considered open until the Appointing Official receives closure evidence, per the plan. The Appointing Official is totally responsible for the decision to close an action.

6.8.2.2 Formally document long-term corrective actions, for offsite corrective actions that take longer than 30 days to complete, include (1) a description of the long-term corrective action; (2) the reason the corrective action cannot be corrected within 30 days; (3) a description of temporary measures taken to control the hazard; and (4) the expected completion date.

6.8.2.3 Provide evidence of action completions to the Appointing Official and S&MA as actions are completed,.

6.8.2.4 Status open corrective actions monthly. Update status in IRIS or send status to S&MA by the 15th of each month.

6.8.3 S&MA shall track the corrective action performance in IRIS and provide status to the Appointing Official and/or the Mishap Board, Investigation Team, or Independent Investigator.

6.9 Assess Corrective Action Plan Effectiveness

6.9.1 S&MA shall periodically assess the responsible organization to determine compliance with the approved CAP.

6.9.2 Compliance and noncompliance shall be communicated to the responsible organization(s) and the Appointing Official, if appropriate.

6.9.3 If the corrective action has not provided the intended results, S&MA shall notify the responsible organization. The responsible organization shall address the situation and take additional corrective action. The Appointing Official is responsible for taking any action as a result of noncompliance.

6.10 To Close the Mishap

6.10.1 When all corrective actions are closed, the Appointing Official shall produce a CAP Closure Statement to the Center Safety Office and the responsible organization to notify them that it is closed.

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6.10.2 The CAP Closure statement shall include:

6.10.2.1 The Mishap Investigation Report.

6.10.2.2 The CAP and any changes to the plan.

6.10.2.3 The final status of the corrective actions, including any final deviations from the plan (e.g., completion date changes, performing organization changes, etc.).

NOTE: It is not necessary to create a new report to fulfill this requirement. It is anticipated that only the final status will need to be developed for this deliverable.

6.10.3 S&MA shall verify the CAP is complete and correctly recorded in IRIS.

6.10.4 The Appointing Official shall designate an individual or team to develop a lessons learned that are significant, valid, and applicable to be provided within 10 work days.

6.10.5 Upon completion of the preceding tasks, the Appointing Official shall distribute the report to other appropriate local organizations, NASA Headquarters, other NASA Centers, and other Federal agencies. At this point, the Appointing Official has met his/her obligations for this mishap and is released from this position.

7. NOTES

None

8. SAFETY PRECAUTIONS AND WARNING NOTES

Mishap scenes can be hazardous. Before anyone is allowed onsite, responsible organizations or the Incident Commander shall determine the hazards (e.g., hazardous materials and chemicals, radiation, blood borne pathogens, etc.) and needed precautions are taken to make the scene safe.

9. RECORDS

9.1 A typical mishap shall have the following records:

9.1.1 Initial Mishap Report, MSFC Flash Mishap Report, or Quick Incident submittal

9.1.2 Management Announcement (MA) or Memorandum - identifying the members of the mishap board, investigation team, or independent investigator; their charter; and a due date for the mishap report

9.1.3 Complete NASA Mishap Report

9.1.4 Mishap Investigation Report

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9.1.5 Corrective Action Plan (and changes)

9.1.6 IRIS files (including corrective action log)

9.1.7 Mishap Summary Report

9.2 Mishap records and reports shall be handled in accordance with the Privacy Act of 1974.

9.3 The S&MA shall use IRIS to maintain records of all mishaps and close calls, track corrective actions to completion, to submit status and closure data to NASA Headquarters, and to perform mishap trend analysis. Hardcopies are also maintained.

9.4 S&MA shall keep mishap records in accordance with NPR 1441.1, "NASA Records Retention Schedules," Schedules 1/119, 120, 121, 122.

9.5 Witness statements, notes, or medical records shall **not** be distributed to a collateral investigation board, other Agency, or OIG unless ordered by a court of law.

10. PERSONNEL TRAINING AND CERTIFICATION

10.1 Training

10.1.1 The S&MA facilitator, ex officio, and at least one member of a mishap investigating authority shall complete NSTC 006, "MORT-Based Mishap Investigation," or an equivalent course and be familiar with MWI 8621.1 with refresher training every 3 years.

10.1.2 IRIS custodian shall be familiar with this MWI, IRIS, recordkeeping requirements of NPR 1441.1, Schedules 1/121[1711]B and 1/122[1711], MPR 1440.2, and the records handling requirements of the Privacy Act of 1974.

10.1.3 The Human Factors Investigator shall, at a minimum, be trained in identification of unsafe acts and errors, causal and contributing factors, performance shaping factors, witness interview technique, data analysis, timeline creation, fault tree analysis, barrier analysis, event and causal factor trees, to draw conclusions and recommendations to reduce human error or mitigate negative consequences of human actions; and basic knowledge of physical and psychological processes and limitations of humans.

10.1.4 Board Members/Investigating Authorities shall, at a minimum, receive onsite orientation training upon assignment to a board which includes roles and responsibilities, NASA/MSFC mishap and related procedures, and description of root cause.

10.1.5 At least one member of the Investigating Authority and the ex officio shall have knowledge of the NASA mishap investigation process, and be able to secure the site, preserve mishap scene, interview witnesses, collect and impound data, records, equipment, facilities,

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create time lines, document facts, generate fault trees, perform barrier analysis, integrate evidence, draw conclusions, generate recommendations and generate mishap reports.

11. FLOW DIAGRAM

See Appendix F.

12. CANCELLATION

MWI 8621.1A dated August 22, 2001

Original signed by
Robin N. Henderson for

David A. King
Director

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**APPENDIX A
EXAMPLE INVESTIGATOR/INVESTIGATION TEAM
ASSIGNMENT MEMORANDUM**

TO: Distribution

FROM: AD20/Edwin R. Jones **[Appointing Official]**

SUBJECT: Investigation of Sulfuric Acid Spill at Building 4700

[Mishap Description] On July 26, 1999, an EG&G technician identified an acid spill within the containment at Building 4700, Deionized Water Facility. The technician notified his supervisor, and a hazardous waste response was immediately initiated. No injuries or hazardous release occurred outside the containment.

[Mishap Team Charter] An investigation team has been established to determine the cause of the mishap and make recommendations to minimize the probability of its recurrence. Ed Cornelius (AD) will chair the team, with Steve Cato (ED), Vyga Kulpa (QS), Rick Burnell (AD), and Farley Davis (AD) serving as members.

[Mishap Report Due Date]. The team's completed investigation report is expected no later than August 8.

Please assure this team is given the assistance necessary to successfully carry out and conclude its investigation.

Edwin R. Jones
Manager
Facilities Engineering Department

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APPENDIX B MISHAP INVESTIGATION LEVELS

<u>Mishap Type</u>	<u>Investigating Authority</u>	<u>Appointing Official</u>	<u>Endorsing Official</u>
Mission-Related, High-Visibility, Mishap or Close Call	Mishap Investigation Board ¹ (MIB)	Enterprise Associate Administrator ¹ (EAA) AA/OSMA concurrence on board Membership	Appointing Official ¹ , AA/OSMA ¹ , AMO ^{1,3} , Procurement ¹ , CHMO ^{1,4} , other ¹
Type A Mishap	MIB (At least 5 voting members)	Administrator ² or Designee or EAA AA/OSMA concurrence on board Membership	Appointing Official, Administrator ² , AA/OSMA, AMO ³ , CHMO ^{1,4} , other ¹
Type B Mishap	MIB (At least 3 voting members)	Center Director or Director, HQ Ops AA/OSMA concurrence on board Membership	Appropriate EAA, Appointing Official, AA/OSMA, AMO ³ , Procurement ⁵ , CHMO ⁴ , other
Type C Mishap	MIT or MI	Center Director, Director HQ Ops, or Designee or EAA Designee ⁶	Appointing Official, Directorate Manager and Center Safety Official
Type D Mishap	MIT or MI	Center Director, Director HQ Ops, or Designee or EAA Designee ⁶	Appointing Official, Department Manager and Center Safety Official
Center-Level Close Call	MIT or MI	Center Director, Director HQ Ops, or Designee or EAA Designee ⁶	Appointing Official, Department Manager and Center Safety Official

Key

- 1 – Occurs when the EAA determined that the high visibility mishap or close call requires an MIB
- 2 – Only when Administrator desires
- 3 – Only when an aircraft is involved
- 4 – Only for injury or fatality mishaps or close calls
- 5 – When needed
- 6 – When the mishap or close call involves Enterprise programs, projects, or activities that are not managed by a Center, program, or project, where the mishap or close calls have occurred outside the Center's gates.

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APPENDIX C

STATEMENT TO WITNESSES

The purpose of this safety investigation is to determine the proximate cause(s) and root cause(s) of the mishap that occurred on _____ and to develop recommendations toward the prevention of similar mishaps. It is not our purpose to place blame or to determine legal liability. Your testimony is entirely voluntary, but we hope that you will assist the investigating authority to the maximum extent of your knowledge in this matter.

Your testimony will be documented and retained as part of the mishap report background files but will not be released with your name as part of the mishap report.

The investigating authority will make every effort to keep your testimony confidential and privileged to the greatest extent permitted by law. However, the ultimate decision as to whether your testimony may be released may reside with a court or administrative body outside NASA.

For the record, please state your full name, title, address, employer, and place of employment.

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APPENDIX D

EXAMPLE MISHAP INVESTIGATION REPORT

TO: AD20/E. R. Jones ← *Appointing Official*
 THRU: AD23/R.E. Burns

FROM: AD23/R.E. Cornelius ← *Investigation Team Chairperson*

SUBJECT: Investigation of Sulfuric Acid Spill at Building 4700

The investigation team has completed their investigation of the acid spill at Building 4700, and the results are as follows:

INCIDENT Description – At approximately 1:30 p.m. on July 26, 1999, an EG&G technician toured Building 4700. At this time, he checked the containment area and found a small amount of incidental water. At approximately 2:45 p.m., the technician returned to Building 4700. He immediately...

FINDINGS – The investigation of this incident revealed the following information:

1. The failure occurred at the acid discharge nozzle.
2. This acid tank had been previously repaired due to the failure of the interior coating before the Deionized Water Facility had been placed in service. That failure was determined
10. A visual inspection of the acid discharge nozzle indicated the top of the nozzle wall approximately 1-inch wide had been penetrated along the 6-inch length of the nozzle.

DISCUSSION – In order for the discharge nozzle to leak, the protective epoxy coating had to be breached thereby directly exposing the carbon steel to the acid.

For future applications, Ceilcote recommends inspecting the coating with a spark detector to locate pinholes and other defects. Ceilcote also recommends using fiberglass

PROXIMATE CAUSE(S), ROOT CAUSE(S), AND CONTRIBUTING FACTORS - The novalic epoxy coating failed due to pinholes. This was most likely the result of poor coating application on the inside diameter of the nozzle. This allowed corrosion to begin on the top

RECOMMENDATIONS – The investigation team recommends the following:

1. Evaluate the cost of repairing the existing tank versus receiving acid in 55-gallon drums ...
3. If the decision is made to manually handle the acid, perform a safety hazard analysis of the

CORRECTIVE ACTIONS – Although the fog items were not a cause for this incident, they should be addressed.

1. Return the pH meter to service ...
3. Several small repairs are need within the 4700 facility.

If you have questions or require additional information, please contact me at 544-xxxx.

Ed Cornelius
 Investigation Team Chairperson

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APPENDIX E

EXAMPLE CORRECTIVE ACTION PLAN (CAP)

TO: Distribution

FROM: AD20/E. R. Jones ← **Appointing Official**

SUBJECT: Corrective Action Plan, Sulfuric Acid Spill at Building 4700

I have reviewed the final investigation report on the subject mishap and have assigned actions to close all recommendations and corrective actions per the enclosure.

Please let me know if the assigned estimated completion dates cannot be met, and we can extend them as necessary. Also, please inform Lane Pugh/AD21 of any date extensions and when each item is closed. She is maintaining a central file of all Facilities Engineering Department mishaps and close calls and shall provide the Industrial Safety Office status information.

Edwin R. Jones
Manager
Facilities Engineering Department

Enclosure

Distribution:

AD22/
AD23/
EG&G/

cc:

AD23/Ed Cornelius ← **Investigation Team Chairperson**
AD21/Lane Pugh
QS10/Vyga Kulpa

Enclosure

RECOMMENDATIONS – The investigation team recommends the following:

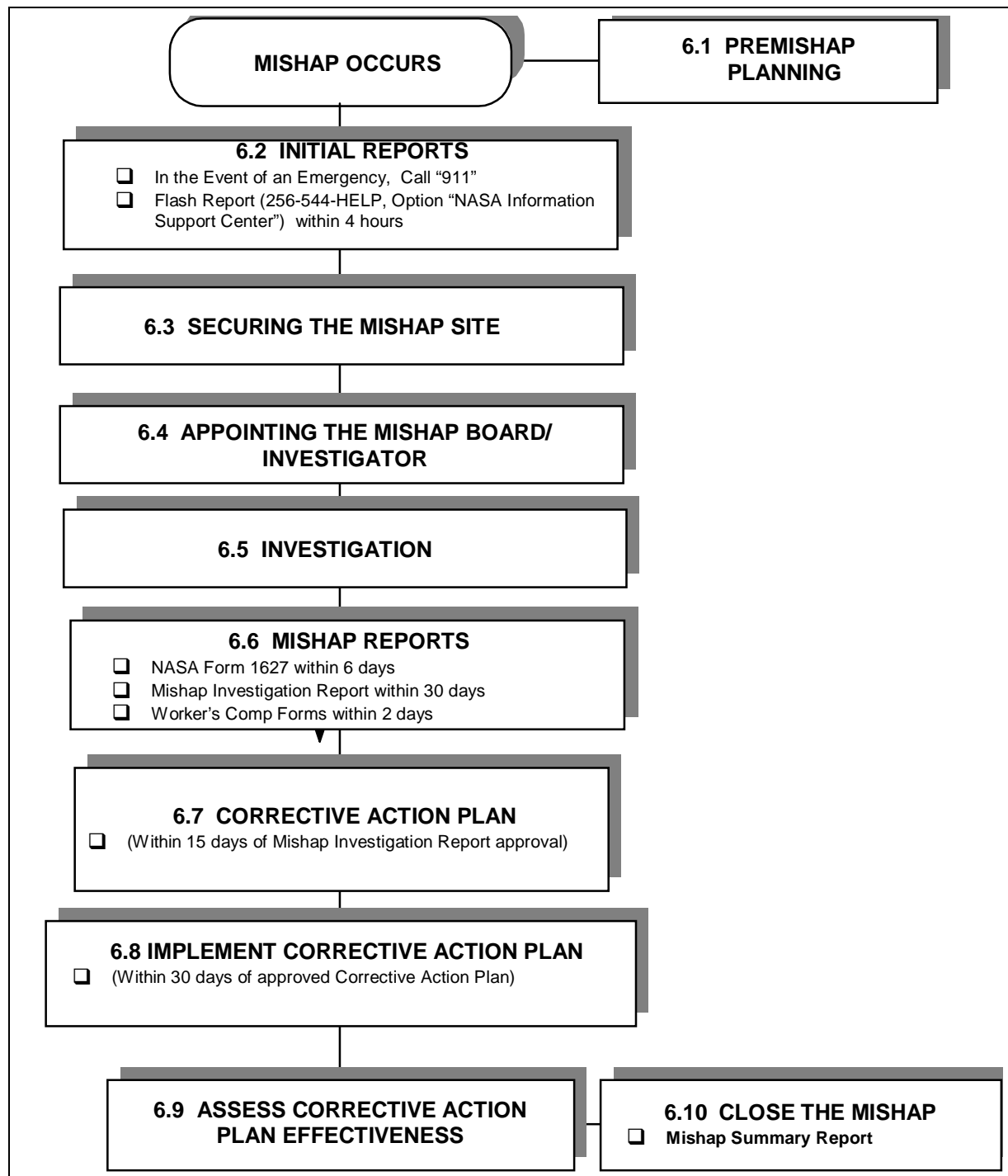
1. Evaluate the cost of repairing the existing tank versus receiving acid in 55-gallon drums ...
Action: Kevin Primm/EG&G Estimated Completion Date: 10/15/99

CORRECTIVE ACTIONS – Although the fog items were not a cause for this incident they should be addressed.

1. Return the pH meter to service ...
Action: Kevin Primm/EG&G Estimated Completion Date: 10/15/99

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APPENDIX F MISHAP PROCESS



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APPENDIX Z GUIDANCE

Z5.3 A close call (although not technically considered a mishap) is reported and investigated to find and correct the root cause(s) of the event before a recurrence results in serious harm. It is important that every NASA employee be continually reminded to look for and report close calls. In addition to the obvious benefit of preventing recurrence, people should develop a habit of vigilance to help eliminate the unsafe acts and unnecessary risk taking that is the primary causal factor of most mishaps.